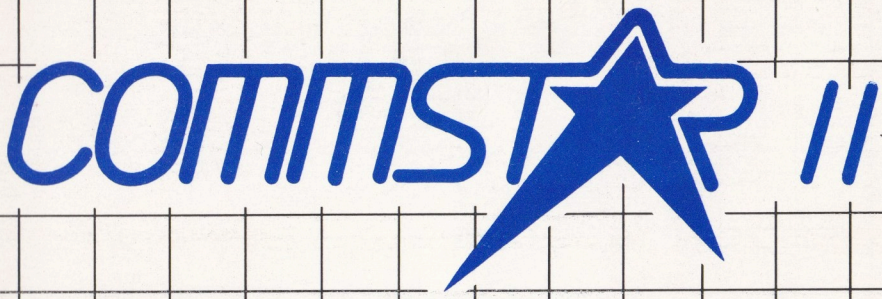

ROM BASED INTELLIGENT
COMMUNICATION FACILITY FOR
BBC MODELS B, B+ AND MASTER
SERIES COMPUTERS

INCORPORATING
PULL DOWN WINDOWS
& OFF LINE EDITING

PACE

Micro Technology

Commstar II

Terminal & Viewdata Communications

User Guide

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CONTENTS

PREFACE

CHAPTER 1 - Introduction to Communications

1.1 Overview
1.2 Communications hardware
1.3 The role of the telephone
1.4 Communication software

CHAPTER 2 - Getting Started

2.1 Installation
2.2 User Registration

CHAPTER 3 - Terminal mode

3.1 Introduction
3.2 The Status Panel
3.3 Menus and Windows
3.4 Data parameters menu (f0)
3.4.1 Auto Line Feed
3.4.2 CTRL codes
3.4.3 Local Echo
3.4.4 Remote Echo
3.4.5 Filter
3.4.6 Mode
3.4.7 Printer
3.4.8 XON/XOFF
3.5 Buffer operations menu (f1)
3.5.1 Buffering and Spooling
3.5.2 Copy
3.5.3 File
3.5.4 Load
3.5.5 Save
3.5.6 Transmit
3.5.7 View
3.5.8 Wipe
3.6 System Options Menu (f2)
3.6.1 Put params
3.6.2 Get params
3.6.3 Initialise
3.6.4 Modem control
3.6.5 Receive XMDM & Transmit XMDM

contents continued..

3.6.6 Lock Status
3.6.7 Foreground & Background
3.6.8 MOS command
3.7 Miscellaneous Features
3.7.1 Elapsed time clock
3.7.2 Send 'Break' level (f6)
3.7.3 Send Escape (f7)
3.7.4 The Break key
3.7.5 The DEL character (ASCII 127)

CHAPTER 4 - XMODEM File transfer

4.1 Overview
4.2 Sending files
4.3 Receiving files
4.4 1200 baud File transfers (with V23 modems)
4.5 Direct connect transfers
4.6 * Commands

CHAPTER 5 - VIEWDATA MODE

5.1 Overview
5.2 Logging on to Prestel
5.3 The '#' symbol
5.4 The function keys

5.4.1 Tag frame	:	f0
5.4.2 Fetch tagged frame	:	SHIFT-f0
5.4.3 Save frame/s	:	f1
5.4.4 Load frame/s	:	SHIFT-f1
5.4.5 Mailbox Editor	:	f2
5.4.6 Function keys	:	SHIFT-f2
5.4.7 Send mailbox	:	f3
5.4.8 Reset clock	:	SHIFT-f3
5.4.9 View frame/s	:	f4
5.4.10 Reveal	:	SHIFT-f4
5.4.11 Download	:	f5
5.4.12 Clear frame tags	:	SHIFT-f5
5.4.13 MOS command	:	f6
5.4.14 Modem control	:	SHIFT-f6
5.4.15 Send 'Break' level	:	f7
5.4.16 Graphic screen dump	:	SHIFT-f7
5.4.17 Send Escape	:	f8
5.4.18 Text screen dump	:	SHIFT-f8
5.4.19 Jotter on/off	:	f9
5.4.20 Spool on/off	:	SHIFT-f9

contents continued ..

5.5 The cursor keys
5.6 The Delete key

Appendix A - Glossary of terms

Preface

Many of you may already be familiar with Commstar in its original form and this guide will simply provide a reference for the new facilities. New owners will find Commstar II easy to use, comprehensive and yet very flexible. This guide details all of Commstar II's features and provides a basic introduction to some of the fundamentals of computer communications from a user's point of view. Commstar II (which we will refer to simply as Commstar from this point on), will operate on any of the BBC series micro-computers (model B, B+, B128 and Master Series) and provides both ASCII and viewdata communications software on a single 16K EPROM.

There are an enormous variety of remote information services on-line and the range of facilities being offered is increasing steadily, Commstar will allow you to access the vast majority of these. Newcomers to communications will find the introductory text in Chapter 1 a useful starting point.

The basic function of Commstar is to provide the software interface which links the BBC computer to services such as Telecom Gold, One to One and Prestel. However, there are other aspects to consider : in particular, Commstar will normally be used to transfer information via the public telephone network so you will require additional equipment in the form of a modem, the function of which is described briefly in section 1.3. If you are unfamiliar with computer communications it may be worthwhile investing in a copy of one of the more comprehensive guides that are now available.

The remainder of this manual is organised as follows :

Chapter 1 : Introduction to communications.

This chapter describes in simple terms the function of the RS423 interface, how modems operate, the role of the telephone and how the software integrates the various parts.

Chapter 2 : Commstar II fundamentals.

Commstar uses a simple system of menus and windows for controlling the various options and commands that are available. This chapter describes how these windows are used, how the BBC's memory is used for temporary storage of data and how the filing system is used.

Chapter 3 : ASCII terminal mode.

There are two main types of remote system that you may access with Commstar, those such as Telecom Gold, One to One etc., which present data in simple ASCII form for use by 'scrolling screen' terminals, and those which use the Teletext standard for presenting information in mosaic graphic form e.g. Prestel. The latter type are generally referred to as viewdata systems. Commstar treats these two types of system in a different manner and this chapter of the guide describes only those features which pertain to ASCII based services.

Chapter 4 : Xmodem File transfer.

Due to the nature of the telephone system, transmitted data is prone to corruption. This can be caused by electrically 'noisy' equipment, signal attenuation etc. In order that important data can be transferred securely and received intact, a number of error detection and correction protocols have been developed. One of the most popular is the XMODEM system developed by Ward Christiensen and the particular implementation which Commstar uses is described in this chapter.

Chapter 5 : Viewdata mode.

Features and commands which are used during access to viewdata host systems are described in this chapter.

Nomenclature.

Throughout this manual section headings and keys on the BBC keyboard appear in **bold**, thus the notation **Return** refers to the Return key.

Messages and prompts displayed on the screen are shown in ***bold italic***.

1. Introduction to communications.

1.1 Overview

Commstar is a communications program which allows the BBC series micro-computers to access a wide variety of remote information services. It has already been noted that there are two broad categories of information service which are referred to here as ASCII and viewdata systems. This duality is reflected in the way Commstar is organised i.e. there are two main parts to the program which are essentially independent. In ASCII terminal mode, Commstar will behave in much the same manner as a terminal connected to a mainframe or mini-computer in a commercial data processing environment. In Viewdata mode however, Commstar will only allow communication with viewdata hosts such as Prestel. The results are very different as you will come to realise when you are more familiar with the two types of system.

To use Commstar you will need, in addition to the computer, a modem, such as Nightingale. It is preferable that the modem you choose (if you do not already have one), is capable of operating at both 300/300 and 1200/75 baud rates, both are in common use. In fact you will not be able to use most viewdata systems if your modem does not operate at 1200/75.

In terms of the information services themselves, British Telecom's Prestel service is probably the best known and the one to which you might most like to subscribe. It provides almost instant access to a multitude of colourful, up-to-the-minute information pages detailing world news and weather, latest travel bulletins and much more. There are also a number of 'Closed User Groups' such as Viewfax and Micronet which provide a range of additional facilities within the auspices of Prestel. These are aimed particularly at micro-computer owners and offer telesoftware, programming advice, news and other facilities. Other viewdata systems exist which serve more specialised areas such as Travel Agencies, Building Societies and Insurance companies. These are rapidly increasing in number and variety.

Another well known service, Telecom Gold, offers a wide range of facilities including Telex and Electronic Mail, and offers access to Statistical Analysis and other programs. In fact, Electronic Mailand Telex are two of the most used facilities and a number of services exist which are dedicated to providing these, One to One and Easylink are notable examples. Vast amounts of information, both of a technical and non-technical nature are accessible through information services such as Blaise (run by the British Libary), Knowledge Index and the american 'Source' system. Virtually all types of service are paid for by a combination of subscription and on-line charges.

Bulletin boards, of which you will no doubt have heard by now, are generally free access. Most are simply micro-computers equipped with auto-answer modems and some special software. This software will accept incoming calls from other computers, take messages and provide the caller with access to other files or programs, and messages left by other users. Although they may lack the sophistication of larger systems, they can still be very interesting and provide a useful 'meeting point' for micro-computer owners.

1.2 Communications Hardware

Commstar uses the serial interface on the BBC micro to send data to and receive data from other computers. The term RS423 is the name given to the standard which defines the electrical and physical characteristics of the particular serial interface used on the BBC. RS423 is a variation of the more widely used standard, RS232. This type of serial interface is used on virtually all general purpose computer systems. The word 'serial' is the important part. A serial interface converts data from one form into another. Within a computer, information is transferred between different components in 'parallel'. You may often hear the 6502 (or 65C02) processor chip which is used in the BBC, referred to as an '8-bit processor'. This means that the internal paths along which data travels are 8 bits wide i.e. there are 8 separate wires which carry data, in the form of electrical signals, around the computer simultaneously. This is acceptable within the confines of a micro-computer but when large distances are involved, problems can arise. The individual bits of data tend to travel at different speeds within the wires and introduce what is known as 'data skew' i.e. the data becomes garbled as it travels (data skew in parallel cables is the main reason that data cables used on disc drives and parallel printers are rarely longer than about 1.5 metres). Another problem is cost, it would be more expensive to lay eight wires across the country instead of one or two. In order to avoid these problems it is necessary to serialise the data and transmit it a single bit at a time through a two or three wire transmission circuit. This is the function of a serial port, it takes parallel data from your computer and passes it a single bit at a time to the outside world, thus making it more suitable for transmission over long distances.

1.3 The role of the telephone.

It is impracticable and expensive to connect two computers together over a long distance with a direct wire connection (commonly referred to as hard-wiring). Apart from the technical problems associated with laying the cable, there is a limit to the distance even a serial signal can travel without being 'boosted'. The simplest solution (although not necessarily the most effective) is to use a network of cabling which already exists, the Public

telephone network. The advantages are obvious; any two computers with access to a telephone can communicate with each other i.e. the communications link is not dedicated to the two particular computers involved such as in a hardwired link. Furthermore the network and the associated equipment already exists and is available for use by the majority of the population. However, there are also a number of problems associated with using the telephone network in this way. These arise from the fact that it was not designed to carry digital signals from computers, it was designed to carry analogue waveforms, in particular, the human voice. Digital signals must therefore be converted into analogue form (i.e. noise), before they can be passed to the telephone network and this task, called modulation is carried out by a modem. In fact the modem carries out two jobs, that of converting the outgoing signal into analogue form and the reciprocal task of converting incoming signals back into a form which the receiving computer can understand (demodulation). Thus a modem both MOdulates and DEModulates electrical signals and as such provides the interface which allows you to connect your computer to the telephone system.

1.4 Communications software

The hardware used in communications provides the physical paths and mechanisms by which data can be transferred. However, just as a disc drive is controlled by a disc operating (or filing) system, a modem requires software which can be envisaged as a 'communications operating system'. Commstar is very powerful in this respect. It provides a wide range of facilities which make communication with remote services simple and efficient. At a basic level, Commstar reads and interprets incoming data from the RS423 port and stores it or acts upon it as required. Whilst transmitting, it reads data from a file or the keyboard and passes it to the RS423 for output, via the modem, to the remote system. Obviously there are many 'housekeeping' functions which must be carried out but Commstar hides all of these from the user making it very simple to use. You must remember that communication is only useful if the parties involved understand each other. In this respect, some form of 'protocol' is required to ensure that each computer knows how to interpret the signals it receives from the other. This protocol is the equivalent of word, sentence and paragraph structure in English i.e. the correct punctuation must be used in order to ensure that the text makes sense to the reader. Commstar provides the ordered environment in which the transfer and control of data can take place.

2 Getting started

2.1 Installation

Commstar is supplied on an EPROM which must be fitted into one of the sideways ROM sockets (except on the Master Series for which it may be fitted into an external plug-in cartridge). These instructions refer to the installation of the EPROM version, please read them through carefully before attempting to fit the EPROM. Avoid handling the EPROM unnecessarily or touching the pins. Before removing the case from the computer, switch OFF and REMOVE the mains plug from the wall socket, then follow these instructions :

1. To gain access to the EPROM sockets remove the four screws marked 'FIX'. There are two of these underneath the front of the computer and two more on the back panel.

2. On a model B release the bolts holding the keyboard in place. These are located at each end of the keyboard, early machines had three, later versions only have two. There is no need to disconnect the keyboard completely, simply move it to one side to expose the EPROM sockets.

3. Locate the row of four or five 28-pin EPROM sockets on the main PCB. On the Model B these are at the front right of the main circuit board, on the B+ and B128 they are located at the rear left. The Master Series has four sockets at the right hand side of the main circuit board. One or more of the sockets will already by occupied by ROMs or EPROMs, at least one must be free so that Commstar can be installed.

4. Before removing the EPROM from its packaging, locate the half-moon notch on its top surface. Hold the ends of the EPROM between finger and thumb, line up the pins with a free socket so that the notch is to the back of the computer or to the left for the Master Series.

5. Ensuring that all legs are correctly located press the EPROM firmly into the socket. It is very important that none of the legs bend out or underneath the EPROM. If the legs of the EPROM are initially splayed too wide, the top surface of the power supply is ideal for bending them upon, should this prove necessary.

6. Replace the keyboard (if it was removed), though do not bolt it down yet. Rest the lid in place and switch on the computer as normal. Typing *HELP will now display the various 'signatures' of the ROMS and EPROMS that are fitted. Commstar should appear in the list as :

Commstar II
Ver.x.xx SN:nnnn

where x.xx is the version number and nnnn is the serial number. If this signature does not appear check once again that the EPROM is inserted correctly.

2.2 User Registration

When Commstar has been correctly installed the serial number, 'nnnn' should be filled in on your registration card which should then be returned to Pace immediately. NO user support will be provided if this card is not returned! Please ensure also that this number is quoted in any correspondence.

3 Terminal mode

3.1 Introduction

Once the EPROM is installed, run Commstar terminal mode by entering the command :

***CTERM n**

where n is the screen mode that you wish to use (0,3,4, 6 and 7 are valid). For instance, entering ***CTERM 7** will switch Commstar on in mode 7 giving an 40 column display. Using ***CTERM** without a mode parameter will enter Commstar in mode 0. Initially, the screen will appear with the message 'Commstar II Ready' at the top of the screen and some rather cryptic looking information at the bottom of the screen. This is the status panel which contains information about how Commstar is configured. A full description of the status panel is given below. In this mode Commstar will behave as a scrolling screen terminal and can be used to access bulletin boards, Telecom Gold, Easylink etc. However, many terminals of this type have only limited control over incoming and outgoing data and this is where Commstar differs; it incorporates many advanced features such as data buffering and simple menu control of terminal characteristics. This section of the manual describes these features.

At this stage it is a very simple matter to go on-line. The default baud rate that Commstar uses is 300 baud so choose a remote service (preferably a bulletin board if this is the first time that you have used a modem), that operates at this speed, configure your modem for 300 baud operation and dial the number. When you hear the carrier signal (a high-pitched whistle), connect the modem and after a short delay you should see incoming data appearing on the screen. If nothing happens check that the modem is correctly installed and configured before trying again.

3.2 The Status Panel

The Status panel which appears at the bottom of the screen when you first switch Commstar on tells you at a glance which features are active and how they are set. In mode 7 it should appear as below :

```
ALF OFF   BUFF  OFF    FILE MEM  ECHO  OFF
FLT  ON   MODE    7    CTRL FLT  PRINT OFF
XON  ON   USED 0000    FREE 5C00 TERMINAL
OFFLINE                          00:00:00
```

The panel occupies the bottom four lines of the screen in 40 column modes but only two lines are used in 80 column modes. The presence of the panel does not adversely affect the display of data which will scroll normally

above this section of the screen. If you do need a full screen for data, the panel can be hidden by using the Lock Status command described later.

Each item in the panel refers to a configurable Commstar feature. For example, ALF stands for Auto Line-feed which may be active for incoming data only, outgoing data only, incoming and outgoing data or off altogether. Consequently the ALF entry may appear as OFF, OUT, INP or I/O to reflect the current setting. The other items in the panel work in the same way, once you understand each of the features the status panel will make more sense.

3.3 Menus and Windows

In Terminal mode, Commstar employs a system of pull-down menus to set parameters and control various options. These menus take the form of a window that appears on the screen, overwriting the current display. Each window consists of the title bar and the option area which lists the options available. The name of the menu appears in the title bar and serves to describe the type of commands in the menu so that each menu groups together commands which are related.

Normally one of the options in a particular menu will be highlighted in inverse. This is referred to as the currently 'selected' option. The Status panel described above effectively summarises the selected options from the menus. To select a new item from a menu just press the initial letter of the option required. This will select AND highlight the new option and change to the next value, to implement the new option you must press **Return**. Alternatively the up and down cursor keys may be used to cycle through the menu options until the required option is highlighted after which **Return** may be used to set the desired value. For instance, with the Data parameters menu displayed (press **f1**), pressing **A** repeatedly will cycle through the various options allowed for Auto-Line-feed, namely INP, OUT, I/O and OFF and back to INP. To change the Local echo option, press **L** until the appropriate option is shown in the status panel.

If you wish to clear a menu without changing the currently selected option you may press either the right or left cursor keys, or **Escape**.

Some options in a menu have an immediate effect which is reflected in the status panel and require no further action. Other options will present a sub-menu with further choices. Each sub-menu works in the same manner as the main menu. When you have finished selecting from a particular menu press **Escape**. This will either return you to a previous menu in the sequence, or, if you are at a main menu, back to Offline or Online mode depending on which was active when you first called up the menu.

There are three main menus controlling Data, Buffer and System parameters. These are called up by pressing **f0**, **f1** or **f2** respectively. Whilst any one of these menus is displayed, one of the others may be called up by pressing the appropriate function key. The first menu will then be cleared and the new one displayed.

3.4 DATA PARAMETERS MENU (f0)

The Data parameters menu is accessed via function key **f0** and contains options which determine the operating characteristics of the terminal.

3.4.1 Auto Line Feed {OFF, OUT, INP, I/O}

The Auto Line-feed option has four possible settings which affect the way in which incoming and outgoing Carriage Return characters are treated.

Line-feeds OFF : When Line-feeds OFF is selected, both incoming and outgoing Carriage Return characters will be treated in the same manner as any other character i.e. Line-feeds will not be inserted after the Carriage Return for input or output.

Line-feeds INP : When Line-feeds INP is selected, a Line-feed character will be inserted in the input stream following each Carriage Return that is received from the remote system. This option would be used in situations where the remote system does not provide Line-feeds in its output stream.

Line-feeds OUT : When transmitting to remote systems which require Carriage Return characters to be followed by Line-feed, switch Line-feeds to OUT. Commstar will then insert a Line-feed after each Carriage Return in the output stream.

Line-feeds I/O : This option causes Commstar to insert a Line-feed character following each Carriage Return in both the input and output streams.

3.4.2 CTRL codes {FLT, DEF, HEX}

The CTRL-codes option from the Data parameters menu allows you to change the way in which Commstar treats incoming control codes. By default Commstar will filter (FLT) out all ASCII control codes other than those between ASCII &08 and ASCII &12. In other words the cursor control codes, Carriage Return, Line feed and Clear screen will be interpreted correctly but all other control codes will be ignored. The status panel entry will appear as FLT.

Setting the option to DEF will cause Commstar to pass all control codes unmodified i.e. they have their standard DEFined effect. In this case received control codes will be treated as if they had been entered at the keyboard. For instance, a CTRL-B received from a remote system would enable the printer as if a VDU2 command had been issued. A third option is available which displays incoming control codes as Hex values. For example, a received Carriage Return would appear as '0D' . This value will be in inverse for all screen modes except 7.

3.4.3 Local Echo {LOC,OFF}

Local Echo can either be ON or OFF. When it is ON, every character transmitted from the keyboard to the host system will also be copied to your screen and the entry in the status panel will show as LOC. If Local Echo is OFF, transmitted characters are not copied to the screen and an echo must be provided by the host system, otherwise you will not be able to see what you type. Most auto-answering host systems such as Telecom Gold, Bulletin boards etc. do provide an 'echo' of the characters that you are sending so that the Local Echo facility within Commstar should be OFF. What you view on your screen will then be the echo from the remote computer. Communication between two Commstars or Commstar and another micro-computer running terminal software, will usually require both parties to turn Local Echo ON.

3.4.4 Remote Echo {REM, OFF}

Normally, Remote Echo will be left OFF. When it is switched on, Commstar will echo incoming data back to a remote system and the ECHO entry in the status panel will appear as REM. This is useful if the remote system is not equipped with a Local Echo facility and cannot therefore display its own transmitted data. You must NOT switch Remote Echo ON when communicating with hosts such as Telecom Gold, they will interpret the echo as being your commands and get very confused!

Note that the ECHO entry in the status panel is shared between the Local and Remote Echo options.

3.4.5 Filter {ON,OFF}

The ASCII character set requires only 7 bits in order to represent the 128 characters available. Since data is transferred within the computer 8 bits at a time, the eighth bit is usually set to '0'. This is also true of the vast majority of incoming data. However, some remote systems may re-map the character set and use the 8th bit set to '1'. It is also possible that noise occurring on the line during data transfers could cause the eighth bit to be

set to a '1' in which case it could be interpreted as a control code and acted upon accordingly. For example, if an incoming byte with the value &0D (a Carriage Return) was corrupted so that the 8th bit was set, it would be received as the character &8D or 141 in decimal. On the BBC machine this code is used in Teletext mode to initiate double height characters. In order to avoid this situation, all incoming data is normally masked (logically ANDed) with &7F in order to ensure that the eighth bit is '0'. Continuing the example used above :

```
    &8D = %10001101 AND
    &7F = %01111111
    ----------------
gives : &0D = %00001101
```

which is the correct character. This type of filtering will only ensure that the 8th bit is set to 0, it will not correct corruption in any of the other bits. If characters from 128 upwards are deliberately being sent and you wish your computer to act upon them, the filter should be switched OFF.

3.4.6 Mode {0,3,4,6,7}

Commstar will display information in BBC screen modes 0, 3, 4, 6 and 7, modes 0 and 3 giving 80 column capability. Remember that when memory buffering is in use, the amount of memory available for the buffer will vary depending upon which mode you are using. Thus, if an attempt is made to switch to a mode which uses more memory whilst Commstar's internal pointer to the top of the buffer exceeds HIMEM for that mode, Commstar will sound the bell to warn you that there is insufficient memory and the switch will NOT take place. This prevents data in the top of the buffer from being overwritten by the screen display. You may of course <S>ave or <W>ipe the buffer and then proceed to change mode. The amount of memory used and free will be updated in the status panel each time the mode is changed.

If you wish to increase the amount of memory available for buffering when using the Master Series computer you may enable the shadow RAM before entering Commstar i.e. enter *SHADOW followed by *CTERM. The amount of extra memory made available will depend upon which screen mode you use. You may also enable shadow RAM from within Commstar by using the MOS command option and then changing the screen mode.

3.4.7 Printer {ON,OFF}

Incoming data can be copied to a printer using this option. When the printer is active, XON/XOFF protocols (see below), are automatically used

to avoid jamming at the input and output buffers. This will only be noticeable when either the printer is very slow or the transmission rate is high i.e. the printer buffer fills and in turn causes 'jamming' at the RS423. If the printer is sufficiently fast (or when a printer buffer is in use) the problem will not arise. The use of XON/XOFF is essential and is independent of the XON/XOFF menu option. In order to receive data reliably whilst printing, the host system must be capable of supporting XON/XOFF.

3.4.8 XON/XOFF {ON,OFF}

In order to ensure that data is transferred correctly between two computers, a number of protocols, both simple and complex, have been developed. One of these involves the use of XON/XOFF flow control. When a host computer which uses XON/XOFF protocols, wishes to access one of its discs or perform some other background task, it will interrupt Commstar II's Transmit buffer function by sending an XOFF signal (CTRL-S). On receiving this signal during transmission, Commstar will enter a 'wait' state until an XON (CTRL-Q) signal is received at which point it will resume transmission. This technique ensures that data is not lost due to overrun at the receiver. The BBC keyboard is strobed at all times during Transmit buffer and even while Commstar is in a wait state you may exit this option by pressing **Escape**. This feature is particularly useful if the system 'hangs' because no XON signal is received from the host following an XOFF. Switching XON/XOFF ON will cause Commstar to acknowledge and act upon received XON and XOFF signals and to use XON and XOFF when receiving data. Switching it OFF will cause it to ignore any XON or XOFF signals received and prevent it from transmitting them.

Note that XON/XOFF flow control is not an error detection/correction protocol.

3.5 BUFFER OPERATIONS MENU (f1)

3.5.1 Buffering and Spooling

f1 provides access to the Buffer operations menu. The options in this menu are used to control the way in which incoming and outgoing data is handled. The term 'buffer' is commonly used in computing to refer to a temporary storage area in which data may be held before or after being processed. Buffers are necessary because of the inherent variation in the speeds at which different input and output devices are able to handle data. For reasons of efficiency, computers move data about in 'blocks'. This is evident when you examine the manner in which data is transferred to and from a disc file. When you read a single byte from a newly opened disc file, what actually happens is that a complete block of data, perhaps 128 bytes in length, is read into a memory buffer from which the particular byte you require can then be extracted. Similarly, when writing to a disc file, data is first placed in a buffer and only when that buffer is full, or the file is 'closed', is it copied to the disc.

Within Commstar, buffering may be used to simplify the handling of incoming and outgoing data. Generally, incoming ASCII data is displayed on the screen as it is received. Once displayed it will scroll off the top of the screen and be lost as further data is received. However, you may wish to record incoming information for longer term storage. If this is the case, simply displaying the data is not sufficient (unless you have a photographic memory!). Commstar offers two ways of dealing with this problem. Temporary storage can be achieved by copying the data into the BBC's memory as it is received (in addition to displaying it). This area of memory is called the buffer and data stored in the buffer can thereafter be manipulated by a number of buffer commands.

The alternative to memory buffering is to copy the data directly to disc (or network filing system) as it is received. This operation is called spooling (due to speed limitations it is not possible to spool to tape).

When memory buffering is in use (as opposed to spooling), and the buffer is ON, incoming data is copied to both the screen and to the area of memory designated as the buffer. The beginning of the buffer is normally set to the OS 'High water mark' (PAGE when using Basic) plus 1.5K (Commstar window buffer), and extends to HIMEM for the display mode selected. On a disc-based model B with 32K RAM operating in Mode 7, there should be about 22K available. On a Master Series with Shadow RAM active this amount may be much larger.

Commstar contains eight commands under the Buffer Operations menu, for

manipulating the buffer and/or its contents. Together these form an important and powerful set of tools which make Commstar efficient and flexible.

The alternative to buffering is to place the data directly on disc as it is received, the maximum amount of data that can then be received in a single transfer is then limited only by the disc capacity. Similarly, during transmission, data may be obtained directly from disc as it is required. This technique is called 'spooling' and it is frequently used during the transfer of data between different devices within a computer system. The choice between buffering and spooling will depend largely upon the nature of the data involved. Unimportant data may be kept temporarily in memory whilst valuable data may be required for longer term storage and spooling will be more appropriate.

3.5.2 Copy {ON,OFF}

Whilst on-line, incoming data can be stored either in memory or on disc depending on whether buffering or spooling is active. By default Commstar will use memory buffering rather than spooling and the buffer will be OFF so that incoming data is not stored. If you wish to switch the buffer ON, use **f1** to display the Buffer operations menu and then press **C**. The change will be reflected in the status panel when the BUFF entry changes to ON. To clear the Buffer operations menu when you have finished, press **Escape**.

In the event of received data exceeding the buffer capacity while the buffer is ON, Commstar will automatically send an XOFF signal to the host computer in an attempt to suspend transmission; at the same time it will switch the buffer OFF (accompanied by a 'beep') and print a 'Buffer Full!!' warning message on the screen. If the host system acts on the XOFF signal you may save the buffer contents should you wish to do so and no data will be lost. To continue receiving data the buffer must be wiped and then switched ON again before going back on-line. At this point the host system, if it responded to the XOFF, will still be waiting for an XON signal. This is issued by typing **CTRL-Q** whilst on-line and will re-activate transmission from the host. If the host does not respond to XOFF then it is inevitable that some data will be lost whilst previously received data is saved.

3.5.3 File {MEM, DSC}

The File option on the buffer menu of Commstar is used to switch between disc spooling and memory buffering. It is the equivalent of the Disc/Buffer command in previous versions of Commstar.

Assuming that buffering is enabled, as it is by default, the FILE entry in the status panel will show as MEM. To switch to spooling, press **f1** to display the Buffer operations menu and then press **F** to select the file option. Commstar will switch to spooling (thus disabling buffering) and change the FILE entry in the status panel to DSC. Commstar will not allow you to use spooling if you are operating under the Tape filing system and will display the message:

Disc !

if you try to switch spooling on when this is the case.

It is important to distinguish between switching from buffering to spooling (or vice versa), and switching the buffer ON. You can switch the buffer ON whether buffering or spooling is active. If buffering is active switching the buffer on will cause Commstar to store incoming data in the memory buffer. When spooling is active and the buffer is switched ON, Commstar will ask you for the filename to be used to store the data. This file will then be opened and will remain open until either spooling is disabled or <C>opy to buffer is switched OFF. If the buffer is already ON when you switch from buffering to spooling it will be switched OFF but data already in the buffer will remain intact.

Remember to have a formatted disc ready when using spooling or otherwise saving or loading data, if there is no disc present the computer will wait indefinately for one to be inserted!

3.5.4 <L> Load

When memory buffering is active, this option will load the specified file from the current filing system into the buffer. It is generally used to load the buffer from a file prior to transmission or to allow an existing text file to be examined using the <V>iew command. <L>oading the buffer will automatically delete the previous buffer contents as if the <W>ipe option had been used. It is up to you to ensure that any important data residing in the buffer has been <S>aved prior to using this option.

3.5.5 <S> Save

The contents of the memory buffer can be saved into a disc (or tape) file using this option. Pressing S will prompt you for the name of the file to be used and Commstar will then use an appropriate *SAVE command to save the data. The catalogue information for the saved data will not necessarily match that of the original transmitted file because Commstar has no way of determining the original Load and Execution addresses. For ordinary

ASCII data this does not matter and it can be loaded into a word-processor for incorporation into documents without difficulty. The same is largely true of Basic programs, all that is necessary is to exit to Basic and LOAD and SAVE the program again. This will create the correct information in the catalogue.

Machine code programs (transferred via XMODEM), present a slightly more difficult task. The receiver must obtain the correct Load and Execute addresses and file length from the sender and then use the appropriate *LOAD and *SAVE commands to re-save the file.

3.5.6 <T> Transmit

Selection of this option will transmit the current contents of the memory buffer to a remote system at the selected baud rate. If the File option is set to DSC you will be asked for a filename and the contents of this file will be transmitted instead of the buffer contents. In either case, before transmission proceeds you will be asked :

Delay (0-9) ?

The speed at which the data is sent to the RS423 port may be varied by selecting a delay between 0 and 9. With a delay of 0, characters are transmitted at full speed, a delay value of 1 will insert a 1/10 second interval between each character, 2 will insert a 2/10 second interval and so on. Usually a delay of 0 will cause no problems but the necessity for this option arises because some host systems are incapable of receiving information in a continuous stream at the operating baud rate. Having selected a delay you will be further prompted with :

Use codes ?

This refers to a system of buffer control codes which are recognised by a number of bulletin board systems e.g. Forum 80. Thus, answering **Y** to this option will allow Commstar to automatically open the buffer in the remote terminal and close it again when the transfer is complete. These codes reduce the risk of spurious characters (caused by 'noise' in the line or equipment) from entering the buffer before or after file transfer. Transmission may be interrupted at any time by pressing **Escape.**

Note that Commstar also responds to incoming Buffer control codes so that two Commstars being used back-to-back can open and close each other's buffers.

3.5.7 <V> View

The buffer contents can be examined at any time using the View option from the Buffer operations menu. Before viewing commences you will be asked whether a hardcopy is required. Reply **Y** or **N** and Commstar will proceed to display the buffer contents. You may pause the display in the middle of viewing by pressing **Space, Escape** will terminate viewing and display the 'Press any key' message.

WARNING : Do not attempt to view programs or other non-ASCII data that has been loaded or downloaded into the buffer via XMODEM. This data will contain control codes that will lock up the screen with sometimes 'fatal' results.

3.5.8 <W> Wipe

This command erases any data in the buffer, use it with care! You will be prompted for confirmation :

Sure ?

Replying **Y** will execute the command, any other key will cancel it. There is no way of recovering the buffer contents once they have been wiped.

3.6 SYSTEM OPTIONS MENU (f2)

Although the use of an RS423 or compatible serial port ensures a high degree of compatibility between different computers from the hardware point of view, there are still a number of factors which must be initialised correctly by the user before communication can take place. The most obvious of these is the speed at which data is transmitted. This rate, referred to as the baud rate may vary from 75 baud up to a maximum (theoretical) of approximately 19200 baud, 300 and 1200 being the commonest in use with micro-computers. A second important factor is the format of the data which is transmitted. How long is each word? (Note that a word in communications equates to a character or byte in normal computing terminology). Is parity used and if so, is it even or odd? and how many stop bits are used? All of these factors must be correctly initialised before any meaningful communication can take place. The commands and options described below provide great flexibility in the way that Commstar can be configured thus allowing it to be used with a wide variety of remote systems.

3.6.1 Put Params

Once Commstar has been configured to suit a particular service that you wish to use, you may save the various parameters into a file on disc. This file can then be used to configure Commstar with a single command (Get params) next time you wish to use it. All options from the Data parameters menu are saved along with the buffer status (ON or OFF), the Lock status, Foregnd, Backgnd and Initialise values. In addition any user defined function key definitions are stored along with the inter-character delay and the buffer transmit delay. When you first select the option you will be asked for the name of the file to be used for storing the parameters. A further file will automatically be created with the same name but in the 'K' directory (DFS only!, use *CDIR K first on ADFS), and this is used for the function key definitions. For example, if you wish to create a parameter file for use with Telecom Gold accessed via PSS at 1200/75 baud you could first set up the following Commstar parameters :

Auto Line-feeds OFF	Local Echo OFF
Remote Echo OFF	Mode 0
Buffer ON	Control codes FLT
Filter ON	Printer OFF
File MEM	XOFF/XON ON

Foregnd & Backgnd as required
Initialise Receive 1200, Send 75; Data format 7 Even 2

You would then program the function keys with the appropriate Network

User Identity and Network User Address and your Telecom Gold Identity and password. Using the Put params option now will save the configuration in the specified file with the function key definitions being saved in a file of the same name in the K directory. Next time you wish to use Telecom Gold, enter Commstar and then use Get params to load the configuration.

3.6.2 Get Params

This is the reverse of the Put params option and allows a set of parameters previously saved using Put params, to be re-loaded. Selecting the option will request the name of the parameter file to be loaded. If the specified file exists it will be read by Commstar and used to configure the various options.

Note : If when the parameters were originally saved, there were no user function keys defined, an error message 'File not found' will be shown when the Get option is used. This is because the function key file has not been created. The error will not cause any problems but it serves as a warning that the function keys are not programmed with your own definitions.

3.6.3 Initialise

This option allows simple initialisation of the RS423 port in terms of the baud rate and data format that are used to transfer data. The options in the initialisation menu govern the precise way in which the RS423 converts the parallel data it receives into serial form for transmission, and conversely, how it interprets incoming data. The menu will appear as follows :

	Word	Parity	Stop
0	7	Even	2
1	7	Odd	2
2	7	Even	1
3	7	Odd	1
4	8	None	2
5	8	None	1
6	8	Even	1
7	8	Odd	1

<R>eceive 300
<S>end 300

The currently selected data format from the menu is highlighted and the current Send and Receive baud rates are shown at the bottom of the menu. To change the data format press the number next to the option required.

The most commonly used protocols are :-

Telecom Gold - 7 data, Even parity, 2 stop
Forum 80 - 7 data, Even parity, 1 stop
TBBS & CBBS - 8 data bits, No parity, 1 stop

The Receive and Send lines below the table indicate the currently selected baud rates. If instead of selecting a numeric option, the **R** or **S** keys are pressed, the appropriate baud rate will cycle through the list of possible values, one step for each key press. Using this method it becomes a simple matter to select the required baud rates. The default baud rate is 300 for both send and receive when operating in Terminal mode. When the appropriate data format and baud rates have been selected press **Escape** to go back to the main menu.

3.6.4 Modem Control

Commstar incorporates the facility to load, from disc, a set of modem driver routines such as those provided for use with the Nightingale accessory board to handle auto-dialling, auto-logon etc. If these routines have not been loaded prior to pressing **SHIFT-f6**, the warning :

No driver!

will be displayed, otherwise, **SHIFT-f6** provides access to the routines.

3.6.5 Receive XMDM and Transmit XMDM (see chapter 4).

3.6.6 Lock status

The status panel can be locked on or off using this command. By default the status panel will be shown both whilst on-line and when a window has been activated. When Lock status is off, the status panel will only be shown when a window is active, it will be cleared when you go on-line.

NOTE : When the status panel is displayed, scrolling is carried out under software control and there is a limit to the speed at which incoming data can be displayed. If you intend to access systems operating at 2400 baud or higher it is advisable to turn the status lock off. If you do need to check a configuration setting the status panel will appear normally when one of the menu keys **f0**, **f1** or **f2** is pressed.

3.6.7 Foreground & Background

When using a colour monitor or television, the foreground and backgound

colours can be chosen to suit your own requirements. Just select either <B> or <F> to step through the range of colours until you arrive at a suitable combination. You may also find this option useful with monochrome screens for optimising the contrast levels.

3.6.8 MOS Command

To enter a MOS command, such as *CAT, from within Commstar, press **f2** followed by *. A window will then be displayed into which one or more commands may be entered. When you have finished entering commands press **Return** to clear the window and then **Escape** to clear the menu if necessary.

You can also switch to Viewdata mode by entering *CVIEW from the MOS window.

3.7 Miscellaneous Features

3.7.1 Elapsed time clock

Commstar maintains its own internal clock which displays the elapsed time in minutes and seconds since it was reset. There are three conditions under which re-setting may occur :

1. When Commstar is first selected
2. When the **BREAK** key is pressed
3. When **f3** is pressed

The clock is displayed at the bottom right of the screen in all modes, is updated every second and remains unaffected by other operations until it is reset by one of the means listed above. After reaching 59:59 the clock 'wraps around' to 00:00, this should be taken as a warning that your next phone bill will be astronomical!!

3.7.2 Send 'Break' level (f6)

Many intelligent terminals are equipped with a special key labelled 'Break'. This is NOT the same as the **Break** key on the BBC micro-computer. its function is to transmit a 'Break' level or 0 volts on the data line in order to 'wake-up' the host computer and initiate the Logon procedure. In order to maintain compatibility with such systems, function key **f6** will generate a Break level whilst on-line.

3.7.3 Send Escape (f7)

It may sometimes be necessary to send an 'ESC' character (ASCII 27) to the host system. Since this cannot be achieved via the **Escape** key, **f8** is programmed to send an 'ESC' to the serial port.

3.7.4 The Break key

Pressing the **Break** key whilst in Commstar will 'warm boot' the EPROM. All previous settings will remain unchanged and data in the buffer will be preserved. However, any menus that were displayed will be cleared and if you were logged-on to a service it is likely that the connection will be lost. This is because pressing **Break** causes Commstar to lose control of the RTS line momentarily and as a result most modems will disconnect. If the lead configuration that you are using does not have RTS connected the modem may not drop the line.

CTRL-Break will re-boot the highest priority language ROM from cold. If Commstar is the highest priority then it will be re-entered with default

values. Normally however, Basic is the highest priority and this will be re-entered. **CTRL-Break** is in fact the quickest way to return to Basic from within Commstar.

3.7.5 The DEL character (ASCII 127)

It has been found that many mainframe systems use the DEL character to 'pad out' messages to remote terminals. The reason for this is largely historical in that when a computer is communicating with a mechanical teletype (as opposed to a glass teletype or VDU), it has to allow time at the end of each line for the print head to return to the beginning of the next line. It is common practice to do this by inserting a stream of DEL characters after each Carriage Return. A mechanical teletype will of course ignore these but on a normal VDU the result is that the cursor backspaces to a point on the previous line. Using the current version of Commstar you may choose to ignore incoming DEL characters by using the MOS command *FX251,1. The default condition is to act upon DEL's normally and this may be re-instated by *FX251,0 if you have previously executed *FX251,1.

4. XMODEM File Transfer

4.1 Overview

Commstar provides full Xmodem file transfer capabilities using the protocols developed by Ward Christiensen. Files which are sent or received under Xmodem are broken down into sequentially numbered 128 byte blocks of data for transmission purposes, although this action is totally transparent to the user. An 8-bit checksum is calculated for each block prior to transmission which is then sent with the data. The checksum is re-calculated at the receiving Xmodem terminal and compared with the original. If they are different then it is assumed that corruption of the data has occurred and re-transmission of the appropriate block is requested. The generation of checksums and block numbers, and the requests for re-transmission of corrupted blocks, is carried out entirely automatically by Commstar and need not concern the user. All errors encountered are re-tried 10 times before the user is given the option of <Q>uitting or <R>etrying. When the option to <R>etry is selected the transmission will be resumed starting with the block following the last block to be successfully transferred. This system virtually assures perfect data transfer even under extreme conditions such as temporary loss of carrier signal or excessive line noise. It is important to realise that this type of transfer can only be used in conjunction with another terminal that is capable of handling the XMODEM protocols.

Under XMODEM, data is transferred in the following format :

SOH	- Start Of Header, decimal 01
Block Number	- one byte
255-Block no	- (block number EOR 255)
Data	- 128 bytes
Data checksum	- 1 byte, carry discarded

It is not within the scope of this manual to cover fully the operation of XMODEM type file transfer and the user is given the above information purely to aid understanding of the process.

4.2 Sending Files

This section describes the procedure for using the <T> command on the System options menu to transmit files under XMODEM. First, check that the RS423 port is suitably initialised. You must use a data format setting with an 8 bit word, XMODEM will not operate with 7 bit data. Now load the file that you wish to send into the buffer. If you wish to transfer directly from disc or if the file will not fit into the buffer, switch the file

option to DSC. Press **f2** to display the system options menu and select **T**. If spooling is active you will be asked for the name of the file which is to be transferred. Enter this and press **Return**. A window will appear as follows :

XMODEM TRANSFER

Waiting for sync..
Blocks sent
Blocks repeated

The transfer will commence as soon as Commstar receives a synchronisation signal from the remote system. As the transfer proceeds a running count is maintained of the number of blocks successfully sent. If errors are detected by the receiving system the block will be re-transmitted and the repeat count will be updated.

At the end of the transfer the message 'Transferred' will appear in the window and if spooling is in use the spool file will be closed.

4.3 Receiving files

The sequence of events for receiving a file is very similar to that for sending. First set up the baud rate and data format and then select the <R> option from the System options menu. If spooling is active you will be asked for the name of the file into which the received data should be placed. If spooling is not active the data will be stored in memory. A window will now appear containing the following :

XMODEM TRANSFER

Waiting for sync..
Blocks received
Blocks repeated

As each block is received the block count will be updated. If any errors are encountered Commstar will inform the host computer by sending a 'No Acknowledge' signal (NAK) and the repeat block count will be updated. It will then wait for the block to be re-transmitted. Successful completion of the transfer is acknowledged in the same manner as for the Transmit option. If spooling was not used the downloaded file should now be saved to disc using the S option from the buffer operations menu.

4.4 1200 baud File transfer (with V23 modems)

It is possible to transfer files between two Commstars using XMODEM at 1200 baud if each of the modems being used is capable of operating at

1200/75 and 75/1200 baud rates. The procedure is as follows :

1. Choose the <I>nitialise option and set the <S>end and <R>eceive baud rates appropriately (sender at TX1200/RX75 and the receiver at RX1200/TX75).

2. Configure the modem appropriately.

3. <L>oad the buffer with the file to send if you are acting as the sender and buffering is in use.

4. Select <T> or <R> appropriately from the System options menu and proceed as usual.

4.5 Direct connect transfers

It is possible to transfer files between two BBC computers or between a BBC and another computer with a direct wire connection i.e. without using a modem. When two BBC computers are being used you will require a 'back-to-back' lead with a 5-pin domino connector at each end. This lead must be wired so that the transmit pin from one end is connected to the receive pin at the other end. Similarly the CTS and RTS signals must be switched over. A lead constructed in this manner should be no longer than about 20 metres.

4.6 * Commands

In addition to normal Commstar operation there are three commands which can be accessed from Basic. Type :

***HELP COMM <Return>**

and they will be listed.

*CTERM and *CVIEW are the two that are used to access Commstar itself, the others are *XREC, *XTRAN and *FPRINT.

*XTRAN and *XREC require a filename as a parameter and will send and receive an file respectively using XMODEM. You must ensure before using these commands that the RS423 port is correctly initialised.

*FPRINT will give a graphic printer dump of a mode 7 screen or viewdata frame. This is the same routine as used in Viewdata mode (see 5.4.16).

5. VIEWDATA MODE

5.1 Overview

The Viewdata mode of Commstar allows the BBC micro to emulate the type of terminal which is used to access viewdata services like Prestel. Such terminals have colour screens, special keyboards and internal hardware which can only be used to display information in a particular form which is known as Teletext. The way in which information is presented by a viewdata host differs considerably from the more commonly used scrolling screen terminals. The most apparent difference is the use of colourful 'mosaic' graphics and text to present information in the form of 'frames' which occupy a complete screen. Fortunately, the BBC micro-computer has a special screen mode, mode 7, which is designed particularly for the purpose of displaying teletext. This means that with the aid of Commstar, the BBC can be used to emulate a viewdata terminal accurately, with a full range of features including double height characters, 16 colour text and graphics etc.

In terms of the services themselves, most operate on a subscription basis with the vast majority of the frames themselves being free. Other frames contain chargeable information. Full details of the particular service that you use including charge rates, a frame directory etc, will be provided when you first subscribe. It is not within the scope of this manual to provide a comprehensive guide to using viewdata services, such information will be provided by the service operator. The following sections detail the procedures used within Commstar to carry out the various functions that are available. For convenience, the remainder of this manual will refer to the Prestel system run by British Telecom in examples.

5.2 Logging on to Prestel

To run Commstar in viewdata mode type :

***CVIEW <Return>**

from Basic (or another language ROM). This will load the program and switch the BBC into mode 7. The screen will clear except for the 'Commstar II Ready' message and a status line at the bottom of the screen.

The baud rate defaults to RX1200/TX75 when Commstar is entered in this way. For most purposes this will be suitable but if a different rate is required simply follow the CVIEW command with the appropriate number from the following table :

0	1200/75 (default)
1	75/1200
2	300/300
3	1200/1200
4	2400/2400
5	4800/4800
6	9600/9600

The data format is set to 7 data bits, Even parity and 1 stop bit and cannot be changed.

To connect to a viewdata host from this point, dial the appropriate number and wait for the 'carrier' signal. When this is present activate the 'modem connect' or equivalent switch on your modem. After a short delay you will see the Prestel introductory page being displayed. This page contains a prompt for your 10 digit Customer Identity number which must be entered before you can proceed further. Note that each key that you press will appear as a dash (-) on the screen.

Following correct entry of your identity code, the next frame will request your 4 character personal password. Once again a dash will be printed for each key press.

Typing errors made during entry of either the Customer Identity or the password may be cancelled by pressing * twice. This will clear the entire line and you may start again. Note that the **COPY** key may also be used to give a '*'.

If you do not have an ID and password, use **4444444444** and **4444** respectively. On Prestel this will give you access to the free demonstration area.

Following successful logon, the host system may be used in much the same way as it would with any other Prestel or viewdata adaptor. There are however some differences in operation and you should read the following sections carefully to make full use of Commstar's features.

5.3 The '#' symbol.

Viewdata systems make extensive use of the # symbol to mean 'Enter' or 'proceed to next frame'. Within Commstar the **RETURN** key is used in place of # for convenience, so where a message such as :

GOTO # to continue

is given, press **RETURN** instead of #.

The reason for this is that some of the character codes used by Prestel differ from those in the ASCII character set. The code used by Prestel for # actually corresponds to the underline character in ASCII, a point that is reflected in the fact that pressing underline in place of **RETURN** has the same effect. To produce a true Carriage Return, you must use **CTRL-M.**

5.4 The function keys.

Each of the ten programmable keys is programmed with two main functions when operating in Commstar viewdata mode. One of these functions is invoked using the function key on its own, the other requires the use of **SHIFT** in conjunction with the function key.

5.4.1 Tag frame : f0

This key provides the facility to 'tag' Prestel frames of particular interest so that you may return to them at a later stage in the Prestel session. To tag a frame in this way press **f0** once. This will store the number of the frame in memory and display the message :

TAGGED

at the bottom of the screen indicating that the action has taken place. The number of pages that you can tag will vary depending on the length of the particular frame numbers stored (a frame number may be between 2 and 10 characters long). There are 256 bytes of memory reserved for tagging so, for example, with an average of 8 characters per frame number you will be able to tag 32 frames. After this the first tagged frame number will be overwritten.

Note that you cannot tag sub-frames i.e. frames which have a suffix other than 'a'. For example, if you try to tag frame 68226c the frame that you actually tag will be 68226a.

5.4.2 Fetch tagged frame : SHIFT-f0

SHIFT-f0 is used to retrieve frames which have previously been tagged using **f0**. Each time you press **SHIFT-f0**, the next frame number in sequence will be used by Commstar to construct a command of the form *page-no# which is then sent to the host system so that the requested frame is subsequently displayed.

When the last tagged frame has been retrieved Commstar 'wraps' around to the beginning of the page sequence i.e. the first tagged frame.

Remember that you must be on-line to use this facility because when tagging frames Commstar does not store the frame itself, only the frame number.

5.4.3 Save frame/s : f1

At any time whilst you are on-line to a viewdata host **f1** may be used to save the currently displayed viewdata frame. Where Commstar stores the frame depends upon the status of the jotter and spooling options.

If the jotter is OFF (see section 5.4.19), pressing **f1** once will display a prompt on the bottom line of the screen for the name of the file into which the frame is to be placed. Enter the filename and press **Return**. This method stores one frame per file.

If the jotter is ON the frame will be copied into the next free space in the jotter, which may be in memory or on disc depending on the setting of the spool option. In addition the message :

LOGGED

will appear briefly on the bottom line of the screen to confirm that the operation has taken place.

The Save function is also used to to save mailbox frames which have been created using the Editor described in 5.4.5 below.

5.4.4 Load frame/s : SHIFT-f1

The load option provides the means of re-displaying those frames which have been copied to disc using the save option.

Pressing **SHIFT-f1** will prompt for the name of the file to be loaded. Commstar will then examine the file and if it is found to contain an individual frame this frame will be loaded and displayed.

If the specified file contains more than one frame, the subsequent action depends upon whether spooling is active. If spooling is OFF all of the frames will be loaded into memory (the jotter) and the first in sequence will be displayed. Commstar will give an indication of how many frames have been loaded and the cursor keys may be used to view other frames. If spooling is ON, only the first frame from the file will be loaded and displayed and the cursor keys may then be used to retrieve and display other frames in the file. Any frames previously held in memory when a multiple load is carried out will be overwritten.

5.4.5 Mailbox editor : f2

Commstar includes a mailbox editor which is invoked using **f2**. Initially the screen will clear leaving a title line at the top and a mailbox frame into which your message may be edited.

Before you proceed to edit the text of the message you must first enter the mailbox number of the addressee. This is a nine digit number but Commstar allows you to enter other characters which provides further addressing capability. In particular, if the first character of the address is a '*', the following numbers, up to an underline character, will be interpreted as a page number. The underline is used to separate the frame number from the actual mailbox number. For example, if you enter :

***77-123456789** (the underline displays as a dash in mode 7)

when you come to send the mailbox you need not go to page 77 first. Commstar will itself call page 77 and then send the mailbox. This feature is useful for sending a mixture of different mailbox types to different addresses, simply incorporate the appropriate page number in front of the mailbox number.

If you press **Escape** or one of the cursor keys when the cursor is positioned at the start of the mailbox number the cursor will move directly to the start of the text area. This allows you to skip over the number if you wish to edit previously created messages.

After entering the mailbox number the cursor will then move to the start of the mailbox text area. The cursor keys may be used to move freely around the frame for entering text and teletext control codes may be entered using the function keys to incorporate graphics and colour effects. The following table lists the keys used to obtain the various effects :

	FKEY	SHIFT FKEY	CTRL FKEY	CTRL-SHIFT FKEY
f0	normal height	double height	conceal	
f1	alpha red	graphic red	continuous	
f2	alpha green	graphic green	separated	load
f3	alpha yellow	graphic yellow		save
f4	alpha blue	graphic blue	black background	
f5	alpha magenta	graphic magenta	new background	
f6	alpha cyan	graphic cyan	hold	
f7	alpha white	graphic white	release	
f8	flash			
f9	steady			

The first frame you edit is the first frame in the jotter (memory only). Pressing **SHIFT-right-cursor** once will move on to the next frame in sequence whilst **SHIFT-left-cursor** will move to the previous frame. This allows you to edit and review a number of messages in one editing session and then send them one after the other whilst on-line.

When you have finished editing one or more messages, press **ESCAPE** to exit the editor and then log on to the remote viewdata service. Unless you have included a page number in the mailbox frame you must now go to the frame number that you require, for example *77#, and then use the SEND function on **f3** to send a mailbox. This will send the last mailbox that you edited (or viewed), subsequent use of **f3** will send the next mailbox in sequence each time. The send function does not wraparound when the last frame in sequence is reached, if you wish to send all of the messages you have created make sure that the last frame you 'edit' is LOCAL 00.

To save edited messages use **f1**.

5.4.6 Function keys : SHIFT-f2

In addition to the pre-programmed functions that Commstar places under the function keys, you can also program your own function key definitions. These may then be invoked by typing **CTRL-fn** where n is the number of the required key. This feature is useful for programming your identity string and/or password for single key transmission and for storing commonly used viewdata command sequences but does not affect the pre-defined key functions set up by Commstar.

To program a key use the BBC's normal *KEY command. Note however, that for use within Commstar each key sequence MUST be terminated with |@ (in Mode 7, | is displayed as ||). For example, to program the string "0123456789" on to function key **f0**, select MOS and enter:

***KEY0 "0123456789|@"**

When you wish to transmit this string simply type **CTRL-f0** whilst on-line.

If you need to include control characters within a string use the vertical bar format. For instance, to include a Carriage Return use **|M**.

Pressing **SHIFT-f2** will present a prompt at the bottom of the screen:

<L>oad or <S>ave ?

which allows you to load or save sets of function key definitions as required. Whichever you select you will be asked for the filename which will then be used appropriately.

5.4.7 Send mailbox : f3

When you have edited one or more mailbox frames, the send function is used to transmit them. The first time you press **f3**, it will send the last frame that you edited, subsequent use of the key will send the next frames in sequence one at a time.

5.4.8 Reset clock : SHIFT-f3

This key may be used at any time to reset the elapsed time clock to 00:00:00.

5.4.9 View frame/s (Carousel) : f4

The view function is used to review stored frames. To view frames held in a disc file first switch spooling on using **f9** and enter the name of the appropriate file. You will be asked if you wish to overwrite this file, reply **N** and then press **f4** to view. The first frame stored in the file will be displayed and the bottom line of the display will show the message :

LOCAL 00

indicating that you are viewing local frames. To step through the frames use the right and left cursor keys to move forwards and backwards respectively. The view function treats the file as if it were circular so that when the last frame in sequence has been shown, there will be a single blank frame and then the first frame will appear again.

To view a frame held in memory first ensure that spooling is off and then press **f4**. You will now be able to cycle through the frames as described above.

The frames in the jotter, whether stored on disc or in memory can also be used to form an automatic carousel display. For example, to create a carousel which displays each frame in the jotter for a period of 10 seconds before moving on to the next frame, begin by displaying the first page of the jotter using the view function and then type **CTRL-D** to start the carousel. The display period can be selected in intervals of 2.5 seconds by changing the CTRL character that you use to set the carousel running i.e. **CTRL-A** would run the carousel at one frame every 2.5 seconds, **CTRL-B** would set the period to 5 seconds, **CTRL-C** would give 7.5 seconds etc.

To stop or pause the display press **ESCAPE**, to continue press the appropriate **CTRL**-letter pair again. To stop the display and leave view mode press **Escape** twice.

5.4.10 Reveal : SHIFT-f4

There is a facility on Prestel to create 'hidden' text fields which cannot normally be seen. These are useful for such activities as quizzes which may be run from time to time. The answers to questions can simply be hidden on the screen and only revealed should they be required. **SHIFT-f4** is used from Commstar to carry out just this function. Pressing it once will reveal any hidden fields which are present. If there are no hidden fields pressing this key will have no effect.

5.4.11 Telesoftware Download : f5

f5 is used to initiate the program downloading procedure from viewdata mode. This is the same key that is used by other Micronet software and should only be used when requested i.e. when you are currently located at a Prestel/Micronet 'header frame'. Full downloading instructions are provided on Micronet for newcomers to the system. Briefly the procedure is as follows.

Select the program that you wish to download and step through the introductory pages until you reach the header frame. This frame consists of information relating to the size of the program, and any special download procedures that apply. The page number of this frame will normally be suffixed with a 'c' and is termed a c-frame. It is also usual at this point for a message along the lines :

Press f5 to download

to be displayed. As an alternative you will be offered the choice of returning to the telesoftware menu.

Assuming that you wish to continue with downloading, press **f5**. If buffering is in use you will notice a short delay and the message :

Checking..

and then a number which indicates the number of frames to be received.

At this point one of two possible actions may be taken by Commstar depending on whether or not you have discs fitted.

1) Tape Filing system

The number of frames that can be held in memory will vary depending on the amount of free RAM. If the whole file can be accomodated, at the end of downloading the message :

Saving => progname

will appear where "progname" is the name of the program as given in the header block during downloading. You will then be asked to press Record and Return on your data recorder. At the end of saving, the cassette motor will be stopped and normal operation will be resumed.

If the file is too long to fit in memory the following cautionary message will be displayed :

May exceed buffer!
Press any key..

This will serve to remind you to have a fresh tape ready onto which the file can be saved as it is received.

Commstar will then proceed to download the file frame by frame until either the download is complete or the buffer becomes full. If the buffer fills first, downloading will be temporarily paused and the current buffer contents will be saved in a file with the filename given in the header block. You will see the message :

Saving => progname
Record then Return

You should now press Play and Record on your data recorder so that saving can commence. When saving of the current buffer is complete the cassette motor will be stopped and the downloading process will continue repeating this stage as often as is necessary to save the whole file. Completion of the download is indicated by an audible 'beep' and you will be returned to normal operation.

2) Disc based system

When discs are in use Commstar first checks to see if spooling is active and if it is the spool file will be closed and a new file will be opened :

Opening => progname

where "progname" is the name of the program given in the header frame. Commstar will then proceed to download the file directly to disc. At the end of the transfer the file will be closed and you will be returned to the download header frame.

If spooling is not active when you start to download, Commstar receives the file into memory. If there is sufficient memory to hold the entire file, the download will terminate normally and Commstar will save the file to disc :

Saving => progname

where "progname" is the name of the program given in the header frame. Occasionally the file you download may be executable in which case Commstar will not save the file immediately but will prompt you with :

<R>un or <S>ave ?

This applies to programs which consist of two or more separate sections contained in one large block of data. If this is the case, the header or c-frame will often contain a message such as :

Commstar users Goto N for guidance
Call address Page+&02

The normal procedure for files of this type is to save the downloaded program, exit Commstar and then re-load the program at the current value of PAGE i.e.

***LOAD filename 1D00**

and then type :

CALL &1D02

whereupon you will be presented with a display which informs you that the separate programs are being saved to tape or disc.

If you press **S** at the <R>un or <S>ave prompt you will be allowed to save the file in the manner described above. Alternatively, pressing **R** will automate the entire process.

When the file to be downloaded will not fit in memory you will be warned with the message :

May exceed buffer!
Press any key

but you need not take any action. Commstar will proceed to download and if the buffer fills, it will store the data received so far on disc :

Saving => progname

It will then continue to download until the file is complete, dumping each section of the program to the file as required. When downloading is complete the file will be closed normally.

Additional notes on downloading.

As each frame of a file is downloaded it will appear on the screen as a continous stream of characters, some of which you will recognise as words. The actual statements of the program are in coded form so you will not be able to identify these. At the end of a frame the screen will clear and the next frame will start downloading. You will notice that the page number at the top of the screen is suffixed with a lower case letter. The header frame of a file is usually a 'c' frame but the letter is incremented through the alphabet until downloading is complete.

If at any time during downloading, Commstar is unable to open a file with a given name (due to a duplicate filename or lack of disc space for example), it will display the message :

Can't open!

and quit the download.

5.4.12 Clear frame tags : SHIFT-f5

This command clears the area of memory used to store the frame tags. There is no warning so you should use the command with care.

5.4.13 MOS command : f6

To carry out a MOS command within Commstar viewdata mode press **f6**. This will display a window into which you may proceed to enter commands such as *CAT, *INFO etc. The '*' is already included in the window so it is only necessary to enter the text of the command followed by **RETURN**. When you have finished entering commands press **RETURN** on its own, this will clear the window and return you to

Commstar. You may use this option to switch into terminal mode by typing *CTERM from the MOS window.

5.4.14 Modem control : SHIFT-f6

Commstar incorporates the facility to load, from disc, a set of modem driver routines such as those provided for use with the Nightingale accessory board to handle auto-dialling, auto-logon etc. If these routines have not been loaded prior to pressing **SHIFT-f6**, the warning :

No driver!

will be displayed, otherwise **SHIFT-f6** will provide access to the routines.

5.4.15 Send 'Break' level : f7

f7 will transmit a 'break' level lasting 0.5 seconds to the remote system.

5.4.16 Graphic screen dump : SHIFT-f7

SHIFT-f7 is used to print the currently displayed frame, including graphics. The routine is designed to work with Epson compatible printers and is very fast, printing an entire frame in less than 25 seconds. However, to minimise on-line time it is probably wise to save those frames that you wish to print on to disc and then print them whilst off-line.

You must ensure that the line-feeds option on the printer is OFF, Commstar provides line-feeds.

5.4.17 Send Escape : f8

Function key **f8** is used to transmit an Escape character (ASCII 27) to the remote system.

5.4.18 Text screen dump : SHIFT-f8

If you do not require a graphics dump, if your printer is not Epson compatible or if you have a daisywheel printer, a text only hardcopy can be obtained using **SHIFT-f8**. In this case graphics will be ignored and only the text, will be printed. Double height text will be printed single height.

5.4.19 Jotter on/off : f9

You may choose to store data, in the form of viewdata frames, either in

memory or on disc. This storage area is referred to as the jotter and is the equivalent of the buffer in terminal mode.

A sequence of (usually) related viewdata frames can be saved in a single file or in memory using the jotter function. When the jotter is switched on, the save command (**f1**) will save the currently displayed frame to the jotter rather than to an individual disc file. The current status of the jotter is shown on the bottom line of the screen as either ***Jot ON*** or ***Jot OFF*** appropriately.

The jotter itself will be held or disc or in memory depending on whether spooling is ON or OFF. In either case the stored frames can be viewed whilst on-line or off-line, or can be used to create a carousel.

For instance, to save a sequence of frames on disc for use in a carousel, the first action to take is to switch spooling ON using **SHIFT-f9**. You will be asked for the filename and the Spool entry in the status line will change to ON when the file has been opened. Now dial the host service, go on-line and go to the first page in the sequence that you wish to save before switching the jotter ON using **f9** (the Jot entry in the status panel will change to ON). To save the frame into the jotter press **f1**. The message :

LOGGED

will appear on the status line. You may then move on to the next frame you require and press **f1** again. Repeat this process until you have all the frames you require and then use **SHIFT-f9** to stop spooling and close the file. This file may then be used to create an automatic carousel display (see section 5.4.9)

With spooling OFF and the jotter ON, the Save command will store frames consecutively in memory. If you wish to save the jotter contents to disc later, you may do so when you switch the jotter OFF. You will be prompted for the name of the file to be used, entering a blank filename by just pressing **RETURN** will turn the jotter off without saving the frames, otherwise the stored frames will be saved to the specified file.

If both spooling and the jotter are ON, turning the jotter off will have no visible effect until you come to use the Save command again at which point you will be asked for the filename and the frame will be saved in a separate file rather than in the jotter file.

5.4.20 Spool on/off : SHIFT-f9

If spooling is not in use, the Spool entry in the status line will appear as OFF and the jotter will be held in memory. Switching spooling ON by pressing **SHIFT-f9** will allow the jotter to be stored on disc instead of in memory. You will be asked for the name of the file to be used for spooling and when it has been opened the Spool entry in the status line will be changed to ON. If the specified file already exists you will be given the option to overwrite it or choose a different name.

5.5 The cursor keys.

Whilst on-line to a viewdata service the BBC's cursor keys operate as follows :

Cursor-right : this sends a # character which has the same effect as pressing **RETURN.**

Cursor-left : issues a *# command which can be used to 'backtrack' up to three frames. In other words, pressing cursor-left from a 'c' frame will call up the previous 'b' frame.

Cursor-up : not used

Cursor-down : re-displays the current frame by issuing a *00 command. This command redisplays the frame as it was last received and does not include any updates that have taken place since it was last requested. If you wish to received an updated version of the frame use *09, remember however that a chargeable page will be recharged for when *09 is used.

5.6 The DELETE key

Whilst viewing a memory based jotter, the delete key is used in conjunction with **CTRL** to delete the current frame and move subsequent frames back one frame in the jotter. The result is that the next frame in the jotter will be displayed.

When used whilst editing mailboxes, **CTRL-DELETE** will clear the current mailbox and place the cursor at the start of the frame.

Auto-answer modem

Some modems are capable of automatically answering a dialled-in call from another suitable modem and setting up the data link. Modems of this type are essential for use in setting up host systems such as bulletin boards which are left unattended.

Auto-dial modem

Auto-dial modems which are capable of originating telephone calls without the use of a telephone device. This may be carried out under operator or software control.

Baud rate

The baud rate is an indication of the speed at which data is passed between two communicating devices, a higher baud equating to a faster transfer rate. In most cases, the bit rate is the same as the baud rate so that when the word length is 10 bits, each word representing one character, then 30 characters/second can be transferred via a 300 baud connection.

Bulletin board

A bulletin board is a computer 'service', usually running on a micro-computer, that accepts calls via an auto-answer modem and allows callers to leave messages, transfer files etc. The software that manages the service can be left unattended to control access to the various facilities that may be available.

Communications software

This term is used to describe software that allows a micro or other computer to emulate a terminal device. Packages that are available range from simple, 'dumb' terminal emulators to more sophisticated packages which provide facilities such as automatic and selective storage of incoming data, automatic dialling of sequences of telephone numbers at particular times, error protection protocols, multi-level security etc.

Data Communications Equipment (DCE)

The international body which governs telecommunications, the CCITT (International Consultative Committee for Telegraph and Telephones) uses the term DCE to describe communications equipment such as modems, multiplexors etc.

Data Terminal Equipment (DTE)

This is the term used by the CCITT to describe terminal equipment in a communications evironment. A DTE might actually be a terminal or it could be a micro-computer running some communications software.

Downloading

The term used to describe the process of transferring data or programs from a remote information/data service to a user.

Host system

This is a general term which is used to describe a computer which accepts data calls from other remote computers or terminals via a suitable transmission medium, usually the public telephone network. In their simplest form they may offer electronic messaging and 'noticeboard' facilities e.g. bulletin boards. At the other end of the spectrum there are some very powerful information services such as the Source and Knowledge index which offer complex search and retrieval facilities for a whole range of specialist information areas. Other facilities which may be found include Telex, Electronic mail, on-line statistical analysis etc.

Modem

A device which both MOdulates and DEModulates data. Modulation is the process of converting digital computer data into a form suitable for transmission over the analogue speech telephone system. Demodulation is the reverse of this, the conversion of incoming analogue data into digital form suitable for use by a computer.

PABX

Private Automatic Branch Exchange is the term used to describe the control equipment which manages internal telephone systems such as British Telecom's Herald™ and Monarch™.

Parity bit

A parity bit is an extra bit that is sometimes added to a character as a simple form of error check. It is best illustrated by example. The binary form of the ASCII character 'A' is 01000001. You can see that there are two '1' bits in this character. With EVEN parity added this character would become 010000010 i.e. after the addition of EVEN parity the number of 1 bits is still EVEN. If ODD parity was used instead, the character would become 010000011.

The idea is that the parity bit maintains the 'eveness' or 'oddness' of the number of 1 bits in a character. Thus when a character with EVEN parity is transmitted over a communication line it should still have an EVEN number of 1 bits at the receiver. If an error occurs during transmission which changes a 1 bit to a 0 (or vice versa) the total number of 1 bits will be no longer be EVEN and the receiver can detect the error.

You can see from this that it is very important for the sender and receiver to be configured for the same type of parity.

Parity checking in this way is not very effective, for example, if two bits in a character are corrupted then the parity will be correct at the receiver.

Protocol

A protocol is a set of rules which both the sending and receiving equipment obey during communication.

PSTN

PSTN is the abbreviation used to describe the voice telephone network. It stands for Public Switched Telephone Network, the word Switched referring to the physical switching of electronic circuits which takes place when you make a call.

RS232

RS232 is the name given to a standard which defines the electrical and physical characteristics of an asynchronous serial interface. The standard originated in America but is now widely accepted throughout the world.

Serial Interface

A serial interface is a device which converts parallel data into a serial form which may be transmitted over a two or three wire circuit. They also carry out the reverse operation of converting serial data into parallel form. Most modems, some printers and a few other devices require serial input and a serial interface allows the connection of such devices to terminals and computers.

Start bits

This is an extra bit added to a character before it is transmitted so that the receiving equipment recognises the start of the character. The start bit is automatically generated by the transmitting RS232 interface and then removed by the receiving interface.

Stop bits

During data transfer, 1 or 2 extra bits may be added onto the end of each character by the RS232 interface so that the receiving equipment can detect the end of the character. These are the 'stop' bits and depending on the quiescent state of the line may be 0's or 1's. The generation of the stop bits at the sender and then their removal at the receiving equipment, is totally transparent to the user and is carried out by the RS232 interfaces.

Terminal

The term originally used to describe a teletypewriter and keyboard which were used to communicate with the Central Processing Unit (CPU) of a computer. The definition has been expanded in recent years to include glass teletypes (VDU's) and microcomputers running terminal software.

Word length

The total number of bits which are recognised as comprising a unit of data transfer, a word. This need not be the same as the word length within the computer, extra formatting bits are added during data transfer (e.g. stop bits, start bits, parity).

XON/XOFF

A simple form of data transfer protocol which is used to control the flow of data. If the receiving system wishes to stop the transmission, for example, to save the data it has already received into a disc file, then it sends an 'XOFF' signal to the host. When the sender receives an XOFF signal it ceases transmission and will not resume until it receives an 'XON' signal from the receiver. XOFF is usually the ASCII character 19 (CTRL-S) and XON is ASCII 17 (CTRL-Q).

XMODEM

A relatively sophisticated form of file transfer protocol, developed by Ward Christiensen, that allows the transfer of any type of file, either ASCII or binary, without conversion. The protocol involves breaking the data into blocks and adding calculated checksums which can be verified by the receiver. It also caters for flow control in that the receiver can request retransmission of blocks that have been received with errors.

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